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A COMPARISON OF THE PICTORIAL, PRINT, AND AURAL MEDIA ON CONNOTATIVE MEANING. FINAL REPORT.

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DESCRIPTORS- *VERBAL STIMULI, *PICTORIAL STIMULI, *AURAL STIMULI, *RATING SCALES, *STATISTICAL ANALYSIS, FACTOR ANALYSIS, FILMSTRIPS, ELECTROMECHANICAL AIDS,

THIS EXPERIMENT SOUGHT TO DETERMINE WHETHER CONSISTENT DIMENSIONS OF JUDGMENTAL BEHAVIOR CONCERNING STATEMENTS PRESENTED IN A GIVEN MEDIUM WOULD BE IDENTIFIED WITH DIFFERENT MEASURING INSTRUMENTS, AND WHETHER THE DIMENSIONS COULD BE RELIABLY REPRODUCED IN THE DIFFERENT MEDIA. 768 SUBJECTS RESPONDED TO 1 OF 4 CONCEPTS PRESENTED THROUGH EITHER THE PICTORIAL, WRITTEN, OR SPOKEN MEDIUM ON 50 SEMANTIC DIFFERENTIAL (S.D.) SCALES. EACH OF 35 S.D. SCALES, WHICH WERE LOADED ON 4 VISUAL MEDIUM FACTORS, WAS USED TO DEVELOP A COMPARISON TEST OF LIKERT TYPE (LT) SCALES. THEN 4 GROUPS, TOTALING 253 SUBJECTS, EACH EVALUATED 3 STATEMENTS FROM A DIFFERENT MEDIUM AND A DIFFERENT CONCEPT. TO DETERMINE WHETHER THE SD RESULTS COULD BE REPLICATED WITHOUT A PAPER AND PENCIL TEST, A SEMANTIC SPACE ANALYZER (SSA) WAS DEVELOPED. IT PRESENTED THE SD SCALES ON SLIDES, AND 87 SUBJECTS RESPONDED ON A POTENTIOMETER. ANALYSIS OF VARIANCE AND CORRELATIONAL ANALYSIS OF MEAN SCORES ON THE 3 TESTS SHOWED THAT THE CORRELATIONS WERE HIGHLY SIGNIFICANT. FACTOR ANALYSIS OF THE SD, LT, AND SSA SCALES YIELDED 2 MAJOR FACTORS WHICH APPEARED CONSISTENTLY WITH DIFFERENT MEDIA AND DIFFERENT TESTS. THUS, THE FACTORS WERE INDEED MEASURING SIMILAR JUDGMENTAL BEHAVIOR IN THE 3 MEDIA FOR MESSAGES EQUATED IN CONTENT AND DIFFICULTY. (LH)

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James A. Anderson

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INTRODUCTION:

To date there have been several dozen studies which compared the aural, pictorial and print channels of communication. Most of these studies have been concerned with these channels' relative effectiveness in transmitting information. A question largely unanswered is whether the messages transmitted through various media are equivalent in the connotative dimensions of meaning. A verbal description of an isosceles triangle appearing in print may evoke some meanings different from those evoked by the drawing of that triangle, even though both refer to the concept of a three-sided figure of a given height and width having two equal sides and so forth. Differences in meaning evoked by statements presented through different media can result from at least two causes: (1) The statements can provide different information and thus refer to different concepts. (2) Or the medium of presentation may itself evoke meanings in addition to those evoked by the statements, or may interact with the latter and result in a completely new set of meanings.

REVIEW OF LITERATURE:

Differences in meaning evoked by different media can occur only to the extent that the media are functionally different. Differences among the media have been catalogued by a number of scholars including Henneman, (9) McCormick, (14) and Hartman. (7) The following have been noted:

1. Speech is essentially a temporal medium providing information over time; the pictorial medium is essentially spatial providing information from relational data.

2. Except for very simple communications, information in speech and print is presented sequentially. Except for relatively complex communications, all of the information in a picture is provided simultaneously.

3. The printed page and the still picture have good "referability." That is, they store information in their display, and all or any part of this information is ready for immediate referral. Speech has this type of referability only if it is recorded. Even then, retrieval is generally more difficult.

4. The information spectrum of vision is many times wider than that of audition.[1]

5. Speech has greater flexibility for making changes in connotation, nuance, and emphasis in response to feedback information. Pictorial and print stimuli ordinarily require advance coding and consequently have little capacity to respond to the immediate situation.

6. Language messages are governed by relatively well defined rules of organization and hence the sequence of assimilation of information can easily be directed by the sender. There are relatively few guide lines for the organization of visual messages and consequently the sequence of assimilation is primarily left to the receiver.

7. The rate of information transmission in speech is restricted by the

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[1]Licklider (12) reports that the human ear responds to a frequency width extending somewhat below 100 cycles per second and somewhat above 10,000 cycles per second. According to Head (8) the band width of visible light is approximately 400×10^{12} cycles per second wide, an astronomical difference. Further, Jacobson (10) notes that the human eye has an informational capacity of 4.3×10^{6} bits per second, while the capacity of the ear is 10^{4} bits per second. This is a 430 fold difference in the maximum capacity, informationally speaking, of the eye and ear.

requirement of sequential presentation. As noted above, pictorial messages can present all of their information at once.

8. Auditory stimuli tend to be more attention demanding; that is, they tend to "break in" even when one is attending to something else. On the other hand, generally, one must be orientated toward the visual stimulus in order to receive it.

9. Vision is more susceptible to fatigue and adaptation than audition.

The effects of the differences among the printed, spoken, and pictorial media have been tested in a variety of ways. The most popular has been to compare their effectiveness in securing retention of information. Hartman (7) has thoroughly surveyed the studies of this type. He concludes that for very young children or illiterate adults with any material, or for any audience with easily comprehended material, audio has an advantage over print. However, "print shows an increasing advantage over audio for literate subjects roughly proportional to the increasing difficulty in their comprehension of the material." Studies of the pictorial channel tend to show that it is more effective than either print or speech on this criterion. Nevertheless, Hartman feels that information concerning the capabilities of the pictorial channel is inadequate. There have been fewer studies made of this channel and those done tended not to include appropriate controls. Particularly lacking, Hartman states, were sufficient controls of the relative difficulty of the pictorial and verbal messages which were compared.

A few studies have compared media using association tests of one form or another. Caulkins, (5) in a very early study, investigated the tendency of subjects to form associations with printed words, spoken words, and objects. She found a greater number of associations for printed

words than for spoken words. There was a far greater number of associations for printed words than for objects.

Karwoski, Gramlich, and Arnott, (11) however, found no significant difference in the number and type of free associations to words, pictures, and objects. They did find a significant difference in the latency period for objects, pictures, and words. The latency period was shortest for printed stimuli, longest for objects.[2] This finding may account, in part, for the Caulkins result. In both of these free association studies the equating of stimuli was done on a judgmental basis with no pretesting in insure equation. For Karwoski, et al. the criterion was that items "were nearly equal as stimuli when presented as a word, a drawing, or object."

There has been but one study which compared the effects of the pictorial channel and the print channel on connotative meaning. Using the semantic differential technique, Tannenbaum and Kerrick (15) have demonstrated a strong relationship between orthographic signs and pictorial representations. These researchers found that responses to the words Eagle, Lion, Bear, Elephant, and Donkey were closely related to responses to outline drawings of these animals. The responses were made on scales representing the evaluative, potency and activity dimensions. Tannenbaum and Kerrick also found that when these drawings were identified as political symbols, the responses related significantly to responses to the name of the political unit represented but not significantly to those to the original drawing. They conclude that, "at least, for the sign classes used, ordinary pictorial signs are semantically equivalent to linguistic signs."

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[2] A shorter latency period in response to auditory stimulation than visual stimulation has been demonstrated by Baxter (3), and by Elliot and Louttit (6).

The present investigation is based upon a study the author conducted at the University of Iowa. That study (1,2) investigated the degree of equivalence of meaning among statements assumed to have the same content but presented through the pictorial, aural, and print channels. The degree of equivalence was measured by the similarity of responses on bipolar adjectival scales (semantic differentiation) and the number of associations made to the statements. The assumption of similarity of content was validated by pretests using the cloze procedure and retention tests. The retention tests were used as the basis for equating stimuli on the amount and type of information they contained. The cloze procedure was used as the basis for equating them on the degree of complexity. The cloze procedure was originally developed as a "readability" index for written materials and has since been adapted for spoken texts. A comparable procedure had not been developed prior to this study for visual materials. This adaptation was part of this study. (Appendix A)

The selection of the pictorial statements was made on the basis of three criteria: First, the content had to be presentable in line drawings which would vary only in the number and shape of the lines used to draw them. Second, the total group of statements had to be divisible into relatively simple and relatively complex material. And third, the material had to represent each end of the representational-presentational continuum. Representational pictures were defined as those pictures which are also object surrogates; presentational pictures as those which are not.

The latter two criteria formed four categories of content: simple representational, complex representational, simple presentational, complex presentational. Three concepts were used in each category. The pictorial statements of these concepts were matched with equated written and spoken

statements.

The results indicated that: (1) statements equated in content and difficulty but presented in different media evoke different connotative meanings. (2) The specific form of these differences varies substantially with the subject matter of the statements. (3) The extent of the difference in connotative meaning among media statements is related, at least in part, to the two dimensions of content used in this study. Within the presentational-representational dimension, more significant differences were found with complex statements than with simple statements. Within the simple-complex dimension, more significant differences among media statements occurred with the presentational statements than with the representational statements. More significant differences among media statements occurred with the simple presentational concepts than with the complex representational concepts. (4) Scales relate to one another in markedly different ways for each medium (pictorial, print and aural) as shown by correlation and factor analyses.

Equally interesting as the substantive results are the methodological questions raised by the study. Of the most interest are those raised by the results from the correlation and factor analyses of the semantic differential data. It was noted in these analyses that the scales related to one another in different ways for different media. Presumably the differing factor analysis results indicate that the meaning of a scale changes when applied to concepts in different media and, presumably, therefore, the scales are measuring different judgmental behaviors. On what basis then can a comparison be made of the scores received by statements presented in different media on a scale or group of scales?

OBJECTIVES:

The present study was designed to

provide a basis for comparison of the scores of similar dimensions of connotative meaning found with various concepts presented in various media. The first step was to determine whether consistent dimensions of judgmental behavior concerning statements presented in a given medium could be identified with different measuring instruments. This, of course, was the answer to the initial question concerning the reliability of the factor scores. The second step was to determine whether the dimensions could be reliably reproduced in the different media. This determination would allow the interpretation of differences that occur among statements assumed to have the same content but presented through the pictorial, aural, and print channels to be delineated.

METHOD:

Four concepts were chosen from the Iowa study's original twelve. They were the Triangles, Fish, Seascape and Circle Graph concepts. The three media statements of these concepts (pictorial, written, and spoken) appeared to best meet the equating criteria used in the original study.

A total of 768 subjects were used for the semantic differential (SD) portion of the study. These subjects were met on a class basis in groups of not less than 60. Each subject responded to one concept presented through one medium on 50 SD scales (Appendix B). The 50 scales were identical to the ones used in the Iowa study. Data from the SD scales were first factor analyzed. The visual medium was shown to have the fewest number of factors with 35 scales loading on four factors. These 35 scales were selected as the basis for the development of the comparison test.

For the comparison test, two seven-place, Likert-type (LT) scales (Appendix C) were developed for each of the 35 SD scales. One scale of the pair represented one adjectival pole; the other, the other. The 70 LT

scales were pretested using the four visual statements and a group of twenty subjects. The mean scores of the LT scales were correlated with the mean scores of the corresponding SD scales. The "negative" LT scales correlated with the SD scales more highly than the "positive." Through inspection, a combination of 19 "negative" and 16 "positive" LT scales were selected. This combination correlated with the SD scales above .73 for each of the pictorial statements and at .78 over all pictorial statements. Four groups of at least 60 subjects (a total of 253 Ss) received this attitude test. Each group evaluated three statements. Each statement was from a different medium and a different concept. The statements were given in the written, spoken, and pictorial order. A pretest of 43 Ss had shown no order effects.

In order to determine whether the SD results could be replicated in something other than a paper and pencil test, the Semantic Space Analyzer was developed. The Semantic Space Analyzer (SSA) utilized a two-channel oscillograph with an event marker, a two-subject response board with each position having two potentiometers (one of which was combined with a push-pull switch) and a Kodak Carousel Automatic Slide Projector. A description of the wiring is presented in Appendix D. Slides were made of each of the 50 SD scales. The adjectives were, however, separated only by space as the center marking areas had been deleted. Ss, when presented with these slides, responded by selecting the adjective which best represented the statement just received and "turning up" the corresponding (left hand knob corresponded to the left hand adjective) "pot." The pots were fitted with pointer knobs which inscribed a 350 degree arc. No scale divided the arc, although the pots were aligned so when the pointer was straight up the pot was half opened. If the Ss were neutral or did not want to respond on a particular adjectival pair, they pulled up on the right hand knob which activated the push-pull switch. The event marker was used to

mark the appearance of each slide.

Eighty-seven Ss were divided into four groups of at least 21 subjects each. They received the statements in the same manner as with the LT scales except that the order of presentation was varied for each set of approximately five Ss. The order of presentation was varied to control for practice effects. The SSA gave three measures: 1) direction, 2) degree of intensity, and 3) latency--the time from the presentation of the slide to the beginning of the subject response.

RESULTS:

Factor Analyses: Data from the SD scales, the LT scales and the SSA scales were submitted to factor analysis using a program developed by Bechtoldt (4). The program finds an oblique simple solution to factor problems. In the SD data four factors were found with the visual medium, five factors with the written and four with the spoken medium (Appendices E, F, and G respectively). Table 1 identifies each of these factors, lists the scales which load at .30 or above, and compares them across media. As can be noted the first two factors provide the greatest comparability across media. The third factor has but two similar loadings. The fourth factor appears only in the verbal media, the fifth only in the pictorial medium. The last factor appeared only in the print medium.

With the LT scales, four factors were found in the visual medium, three in the written, and five in the spoken (Appendices H, I, and J respectively). Table 2 presents the factors and scales in the same manner as Table 1. Once again the first factor shows the greatest similarities among the three media. The second factor has five relatively high loadings across media although some noted in parentheses do not reach the .30 level. The third and fourth appear in the pictorial and aural media. Factors five and

TABLE 1

Factor One

Pictorial	Written	Spoken
Whole	Whole	Whole
Perfect	Perfect	Perfect
Clear	Clear	Clear
Formed	Formed	Formed
Precise	Precise	Precise
Balanced	Balanced	Balanced
Definite	Definite	Definite
Complete	Complete	Complete
Direct	Direct	Direct
Organized	Organized	Organized
Stable	Stable	Stable
Graceful		Graceful
Objective		

Factor Two

Pictorial	Written	Spoken
Colorful	Colorful	Colorful
Exciting	Exciting	Exciting
Artful	Artful	Artful
Interesting	Interesting	Interesting
Beautiful	Beautiful	Beautiful
Mature	Sharp	Active
Adult	Graceful	Emotional
Fast	Warm	
Difficult		
Complex		
Intelligent		

TABLE 1 cont.

Pictorial	Written	Spoken
Factor Three		
Straight Angular	Straight Angular	Straight Angular
Hard Constrained Constricted Masculine		
Factor Four		
Pictoral	Written	Spoken
(No Comparable factor appears)	Difficult Complex	Difficult Complex
		Mature Adult Fast Intelligent
Factor Five		
Pictorial	Written	Spoken
Active Sharp Emotional Warm	(No Comparable Factor Appears)	(No Comparable Factor Appears)
Factor Six		
Pictorial	Written	Spoken
(No Comparable Factor Appears)	Mature Adult Masculine Intelligent	(No Comparable Factor Appears)

Table 1--SD scales loading on individual factors at .30 or above. Factors are arranged for comparison across media.

TABLE 2

Factor One

Pictorial	Written	Spoken
Whole	Whole	Whole
Perfect	Perfect	Perfect
Clear	Clear	Clear
Formed	Formed	Formed
(Precise .265)	Precise	Precise
Definite	Definite	Definite
Complete	Complete	Complete
Direct	Direct	Direct
(Organized .240)	Organized	Organized
Stable	Stable	Stable
	Balanced	Balanced
	Intelligent	Intelligent
	Objective	
	Mature	
	Adult	

Factor Two

Pictorial	Written	Spoken
Colorful	Colorful	Colorful
Exciting	Exciting	Exciting
Artful	(Artful .246)	Artful
Interesting	Interesting	(Interesting .207)
Beautiful	(Beautiful .347)	Beautiful
Fast	Fast	
Sharp	Sharp	
Emotional	Emotional	
Mature		Active
Adult		Graceful
Complex		Free
Intelligent		
Objective		

Factor Three

Pictorial	Written	Spoken
Straight	(No Compa-	Straight
Angular	rable Factor Appears)	Angular
Precise		
Balanced		
Organized		

TABLE 2 cont.

Pictorial	Written	Spoken
Factor Four		
Hard Rough Difficult Masculine Free Spacious	(No Comparable Factor Appears)	(No Comparable Factor Appears)
Factor Five		
(No Comparable Factor Appears)	(No Comparable Factor Appears)	Mature Adult Fast Sharp Interesting
Factor Six		
(No Comparable Factor Appears)	(No Comparable Factor Appears)	Difficult Complex
Factor Seven		
(No Comparable Factor Appears)	Graceful Beautiful (.387)	(No Comparable Factor Appears)

Table 2--LT scales loading on individual factors at .30 (exceptions noted in parentheses) or above. Factors are arranged for comparison across media.

TABLE 3

Pictorial	Written	Spoken
Factor One		
Whole	Whole	Whole
	Clear	Clear
	Balanced	Balanced
	Definite	Definite
	Organized	Organized
Graceful	Graceful	
Interesting	Formed	Direct
Beautiful	Precise	
	Complete	
	Stable	
Factor Two		
Colorful	Colorful	Colorful
Exciting	Exciting	Exciting
	Artful	Artful
Emotional	Emotional	Emotional
	Interesting	Interesting
	Beautiful	Beautiful
Active	Active	
Factor Three		
(No Comparable Factor Appears)	Mature	Mature
	Adult	Adult
	Intelligent	Intelligent
		Complex
Factor Four		
Precise	(No Comparable Factor Appears)	Precise
Complete		Complete
Hard		Formed
Definite		Difficult
Masculine		Contrained
		Constricted
		Stable

TABLE 3 cont.

Pictorial	Written	Spoken
Factor Five		
Difficult Complex	Difficult Complex	(No Comparable Factor Appears)
Adult Fast Constrained		
Factor Six		
Formed Mature Balanced Sharp Organized Stable Intelligent Objective	(No Comparable Factor Appears)	(No Comparable Factor Appears)
Factor Seven		
(No Comparable Factor Appears)	Constricted	(No Comparable Factor Appears)
Factor Eight		
(No Comparable Factor Appears)	(No Comparable Factor Appears)	Perfect

Table 3--SSA scales loading on individual factors at .30 or above. Factors are arranged for comparison across media.

six only in the aural and seven only in the print medium.

With the SSA scales five factors were found in each of the media (Appendices K, L, and M). It should be noted that the small number of Ss used in this portion of the study relegates the factor analysis results to an exploratory level. Table 3 presents the factors and scales as before. In this case the first factor does not show the strongest comparability, as in the pictorial medium this factor has split in two and partially appears as factor seven. The second factor has three substantial loadings across media. The next three factors appear in only one medium.

Inspection of the three tables shows at least two factors which consistently appear with different media and different tests. Factor one can be identified as structural (whole, perfect, formless); factor two as aesthetic evaluation (colorful, beautiful, interesting). Inspection of the nine factor matrices themselves indicates that ten scales which load on the structure factor and five which load on the aesthetic evaluation factor retain a consistent pattern of loading across media and tests. It can be assumed then that these fifteen scales evoke substantially the same meaning and judgmental behavior for different media and in different testing situations. These fifteen scales, listed in Table 4, formed the basis for comparison of the three media reported below (page 15).

Comparison of the Testing Procedures: In order to better define the similarities and differences among the three tests, analyses of variance and correlation analyses were conducted. Table 5 shows, for each medium, the correlations between the mean scores of each scale from one test with the mean scores of each scale from the other two tests. All of the correlations are significant beyond the .001 level. It

is apparent that all three tests are measuring substantially similar behavior although between 23 and 60 per cent of the variance remains unaccounted.

TABLE 4

Factor One "Structure"		Factor Two "Aesthetic Evaluation"
Whole	Definite	Colorful
Perfect	Incomplete	Exciting
Clear	Direct	Artful
Formed	Organized	Interesting
Precise	Stable	Beautiful

Table 4--Scales which show high comparability across media and measuring instruments in factor analysis results.

TABLE 5

	SD/LT	SD/SSA	LT/SSA
Pictorial	.63	.84	.63
Written	.80	.88	.69
Spoken	.85	.84	.74

N = 140

Table 5--Correlations by medium between mean scores of each scale from each test.

Data from the three tests were also submitted to an analysis of variance for each medium over all 35 scales Lindquist (13) Type 1 . All of the two-factor interactions (scales and test) were significant (p=.05). Data were then broken down and separate simple random analyses done for each scale. These analyses indicated that there was no discernable pattern of differences among the three tests looking across media. However, it was felt that the number of differences between a pair of tests would be a further indication of the comparability of the tests. Table 6 presents the number of scales which showed significant differences between a given pair of tests.

TABLE 6

	SD/LT	SD/SSA	LT/SSA
Pictorial	17	12	21
Written	18	17	22
Spoken	22	16	22

Table 6--Number of scales for each medium showing a significant difference between pairs of tests.

Comparison of the Media: The three media were compared across the scales which comprised Factors One and Two. The comparisons on the SD, LT, and SSA scales follow in that order.

Data from the SD scales were first analyzed for each factor by scales and media. For Factor One, the interaction of scales and media was significant. Simple random analyses were then conducted. Table 7 gives the mean score for each scale within each medium. Significant differences between pairs of media are noted. From this table we can see that the spoken medium is

rated consistently more toward the "positive" (indicated by the lower mean score) side (Whole, Perfect, etc.) of the scales than the written or pictorial. The differences between the written and pictorial are mixed, perhaps indicating no real difference over this dimension.

TABLE 7

Scale	Pictorial	Written	Spoken
Whole	3.19	3.14	2.77#*
Perfect	3.88	4.01	3.82
Clear	3.14	4.43#	3.31 *
Formed	2.33	2.72#	2.17 *
Precise	3.39	2.93#	2.36#*
Definite	3.38	3.30	2.84#*
Complete	3.25	3.20	2.80#*
Direct	3.42	3.29	2.39#*
Organized	3.07	3.42	2.34#*
Stable	3.79	3.11#	2.60#*

#Significantly different from the pictorial medium at the .05 level of confidence.

*Significantly different from the written medium at the .05 level of confidence.

Table 7--Mean scores for each SD scale in each medium for Factor One.

For Factor Two the same analytical procedures were followed as for Factor One. The two-element interaction of scales and media was significant. Table 8 presents the mean scores for each scale in each medium. Inspection of this table shows the verbal media scoring more toward the "negative" (indicated by the higher mean score) side (Ugly, Boring, etc.) than the pictorial. The differences between the print and aural media were mixed, perhaps again suggesting no real difference.

TABLE 8

Scale	Pictorial	Written	Spoken
Colorless	5.29	5.48	5.80#*
Unexciting	5.13	6.04#	6.15#
Artless	4.02	4.38#	4.25#
Boring	4.26	5.29#	5.33#
Ugly	4.01	4.60#	4.34#*

#Significantly different from the pictorial medium at the .05 level of confidence.

*Significantly different from the written medium at the .05 level of confidence.

Table 8--Mean scores for each SD scale in each medium for Factor Two.

The analytical approach[3] used with the SD data was also used for the scales. For Factor One, the two-element interaction was significant. Table 9 gives the mean scores for each scale in each medium. These results substantially replicate the results found for the SD scales. The pictorial and the spoken media show the greatest difference between them; the written and the pictorial the least.

[3]Because of the different collection procedures different analytical designs were used for the SD and the LT, SSA data. For the SD, a Type 1 analysis followed by a simple random and where appropriate t tests of difference were used; for the LT and SSA an AxBxS analysis followed where appropriate by an AxS and t test of difference.

TABLE 9

Scale	Pictorial	Written	Spoken
Whole	3.83	3.20#	2.70#*
Perfect	4.87	5.06	4.62 *
Clear	3.46	4.48#	3.39 *
Formed	2.92	3.79#	2.71 *
Precise	4.28	3.24#	2.86#*
Definite	4.25	3.86#	3.12#*
Complete	4.49	4.01#	3.44#*
Direct	3.49	3.33	2.67#*
Organized	3.57	3.94#	2.86#*
Stable	3.69	3.72	3.13#*

#Significantly different from the pictorial medium at the .05 level of confidence.

*Significantly different from the written medium at the .05 level of confidence.

Table 9--Mean scores for each LT scale in each medium for Factor One.

The two-element interaction was not significant for Factor Two. The main effects of media and scales were, however. The written medium was significantly less aesthetic than the pictorial medium was. The difference between the spoken and the pictorial approached significance (.20 p ,10). So that we might compare the results from the other tests, Table 10 presents the mean scores for each scale in each medium from Factor Two. The results are similar to the SD results except that there the spoken medium tends to be closer to the pictorial.

TABLE 10

Scale	Pictorial	Written	Spoken
Colorless	4.98	5.48	5.22
Unexciting	5.26	5.66	5.47
Artless	4.16	4.54	4.09
Boring	4.49	5.11	4.58
Ugly	5.12	5.56	5.22

Table 10--Mean scores for each LT scale in each medium for Factor Two.

Finally, the SSA scales for both factors were analyzed in the same manner as the LT scales. For Factor One the two-element interaction of scales and media was significant. Table 11 presents the mean scores as before. The pattern of differences that has previously appeared appears again except that this time the pictorial medium received more positive scores than it did with the other two instruments.

For Factor Two the two-element interaction was not significant, but the effects of media and scales were. The written medium was found to be significantly less aesthetic than the spoken or pictorial. The spoken and pictorial media were quite similar on this factor. Table 12 presents the mean scale scores for this factor.

DISCUSSION:

Factor analysis results: The appearance of a different number of factors for different media and for different measuring instruments coupled with the appearance of different scales loading on similar factors for different media and

TABLE 11

Scale	Pictorial	Written	Spoken
Whole	3.24	2.62	2.80
Perfect	4.80	4.56	4.26
Clear	2.74	4.21#	3.24 *
Formed	1.70	1.92	1.64
Precise	3.02	2.50	2.15#
Definite	3.49	3.20	2.97#
Complete	3.60	2.92	2.71#
Direct	2.97	2.92	3.24
Organized	2.68	2.71	2.25
Stable	3.03	2.61	2.56

#Significantly different from the pictorial medium at the .05 level of confidence.

*Significantly different from the written medium at the .05 level of confidence.

Table 11--Mean scores for each SSA scale in each medium for Factor One.

TABLE 12

Scale	Pictorial	Written	Spoken
Colorless	5.85	6.22	5.48
Unexciting	5.70	5.95	5.79
Artless	3.59	3.82	3.89
Boring	4.59	5.17	4.34
Ugly	3.80	4.45	3.95

Table 12--Mean scores for each SSA scale in each medium for Factor Two.

measuring instruments indicates an interaction among scale meaning, type of measuring instrument, and medium of stimulus presentation. This interaction suggests that a proportion of the scales score will be determined by the choice of testing procedure and medium of stimulus presentation. However, scales can be chosen which are relatively stable in their meaning insofar as they relate to one another in similar ways across media and tests. The number of scales exhibiting such stability in this study was small in number. They represented 30 per cent of the total. It is apparent, therefore, that the selection of scales must be through a rather rigorous procedure rather than selection by the face value of the scales.

Comparison Media: The result of the verbal media scoring higher on the structural factor may be due to the grammatical structure provided by language. As noted in the introduction there are few if any "rules of assimilation" for pictorial presentations. At least, most of us have not been taught how to look at a picture; we have not learned a grammar of pictorial messages as we have for verbal messages. Therefore our perception of a pictorial presentation must be less systematic, less structured than our perception of language stimuli. Further support for this suggestion comes from the fact that the spoken medium scores higher than the written. The spoken medium, by virtue of the almost absolute control of the sequence of presentation, provides the most structure for the assimilation event.

Following this suggestion the questions are raised whether persons can be taught to "read" picture more efficiently and effectively. Can we introduce "system" into the perception of pictorial presentations. These seem to be important questions. They deal with the understanding of illustrations in textbooks, the

usefulness of drawing on the blackboard and/or the ability to view motion picture films and television programs intelligently. These questions deserve additional study.

Perhaps it should not be surprising that a picture scores higher in aesthetic evaluation than a verbal description of a picture. The fact that a verbal presentation will score higher if simply presented aurally rather than in print perhaps is. We would suggest that the dimension of voice with its many variables adds interest to the rather simple presentations used in this study.

Looking at the results from both factors, perhaps the clearest finding is that messages which are effective in one medium will not necessarily be effective when presented through another medium. The "value" of a message changes according to the medium of presentation. In this study a relatively limited sample of messages was used. In order to determine the lawfulness of the values imputed to different media by our results, a larger and more heterogeneous sample of messages, perhaps equated on additional dimensions, needs to be utilized.

From both factors we can also see that the relationships among media vary on different dimensions of judgment. The written medium is most like the pictorial on the structure factor; the spoken most like the pictorial on the aesthetic evaluation factor. No single medium, therefore, can be chosen to best reproduce all responses evoked by another.

As messages presented through different media give rise to different responses on given dimensions, the need to study multi-media presentations becomes apparent. What, for example, is the total effect of a message presented through multi-media techniques in which one medium is

evoking approach behavior and another avoidance behavior? The finding presented in this paper indicate that this contradiction does happen. A multi-media presentation per se, then, cannot be considered more effective than a single medium presentation. Certainly it is obvious that any combination of media can only increase the possibility of error. Methods which will minimize the occurance of these errors need to be investigated.

CONCLUSIONS:

From this study these conclusions are warranted:

1. The majority of scales used in this study changed meaning according to medium of presentation and instrument of measurement.

2. Through comparison of factor analyses, scales can be selected which are relatively stable in their meaning across media being judged and measuring instruments.

3. The verbal media generally score higher than the pictorial medium on scales measuring structure. The spoken medium generally scores higher than the written.

4. A picture generally scores higher in aesthetic evaluation than a verbal description of a picture. A spoken description scores higher than a written one.

5. Media relate to one another differently on different dimensions of judgment. In the two dimensions found here the written medium was most like the pictorial in structure factor; the spoken was most like the pictorial in the aesthetic evaluation factor.

6. Messages which evoke a given response when presented through a given medium will not necessarily evoke that

response when presented through a different medium.

SUMMARY:

This study was designed to provide a basis for comparison of the scores of similar dimensions of connotative meaning found with various concepts presented in various media. Utilizing factor analysis, two dimensions of connotative meaning were shown to appear consistently in the pictorial, print and aural media for three different measuring instruments. This stability was taken to indicate that these dimensions were measuring similar judgmental behavior in the three media. Comparison of the media on these two dimensions indicated that messages equated for content and difficulty but presented in different media evoke different responses on given dimensions of judgment.

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APPENDIX A

Visual Cloze Procedure

The cloze procedure was extended to visual materials in the following manner: Drawings were prepared with india ink on grey stock. The drawings varied on two dimensions: The number of lines and the type of lines. Simple drawings were made using only straight lines of a single thickness. More complex drawings were produced by increasing the number of lines, using curved lines, and/or combining lines with other shapes either regular or irregular.

To form the closure blocks a grid was prepared. The grid formed cells 1/4 by 1/4 of an inch. Every seventh cell was inked-in and the remaining lines erased. This sequence was chosen to insure that no two inked-in cells would be contiguous vertically, horizontally or diagonally. The purpose of this restriction was to assure the full operation of context. The first cell to be blocked out was chosen randomly. A photographic transparency similar to a large slide used for an overhead projector was made of the grid. The result was an 8 x 10 matte transparent except for the opaque blocks of the inked-in cells.

To complete the test materials the line drawings were photographed. In the printing process the grid or matte was laid over the photographic paper. In the finished picture the closure blocks appeared white on the grey background of the line drawing.

There are several advantages to using this procedure: The closure blocks are easily identified. Subjects can respond directly on the test materials and not be concerned with transfering the relative positions of the lines to a separate sheet. Answer sheets can be produced by removing the matte after the photographic paper has been partially exposed and then finishing the exposure.

APPENDIX B

INSTRUCTIONS

The purpose of this study is to measure the meanings of certain things to to various people. You will be presented a statement either written, spoken or a picture. You will be asked to rate this concept on a series of descriptive scales. There will be fifty scales in all. Here is how to use these scales.

If you feel that the concept presented to you is very closely related to one end of the scale, you should place your check mark as follows:

Fair _X_:___:___:___:___:___:___ Unfair

or

Fair ___:___:___:___:___:___:_X_ Unfair

by placing your check mark at one end you are saying that the concept is either very fair or very unfair.

If you feel that the concept is quite closely related but not extremely related to one or the other end of the scale, you should place your check mark as follows:

Good ___:_X_:___:___:___:___:___ Bad

or

Good ___:___:___:___:___:_X_:___ Bad

By placing your check mark in this position you are saying that the concept is fairly good or bad but not very good or bad.

If the concept seems only slightly related to one or the other side (but is not really neutral) then you should check as follows:

Bright ___:___:_X_:___:___:___:___ Dull

or

Bright ___:___:___:___:_X_:___:___ Dull

By placing your check mark in this position you are saying that the concept is only slightly bright or dull.

Go right on to the next page.

The direction or the side that you pick will depend on which of the two ends seem most characteristic of the thing that you are judging.

If you consider the concept to be neutral on the scale, that is, both sides of the scale are equally associated with the concept, or if you feel the scale is irrelevant or unrelated to the concept, then you should put your check in the middle space.

Complete ____:____:____:__X__:____:____:____ Incomplete

IMPORTANT:

1. Place your checks in the middle of the space, not on the boundaries:

THIS	NOT THIS
____:__X__:____:____:____X____:____	

2. Be sure to check every scale. DO NOT OMIT ANY.

3. Never put more than one check mark on a single scale.

Work these scales straight through--DO NOT LOOK BACK AND FORTH through the items. Do not try and remember how you checked similar items earlier in the test. Make each item a separate and independent judgment. Work at a fairly high speed through this test. Do not worry or puzzle over individual items. It is your first impressions, your immediate feelings that we want. On the other hand, please do not be careless because we want your true impressions.

THANK YOU

Go right on to the next page.

ACTIVE	_ _ _ _ _ _ _	PASSIVE
EMOTIONAL	_ _ _ _ _ _ _	UNEMOTIONAL
GOOD	_ _ _ _ _ _ _	BAD
FEMININE	_ _ _ _ _ _ _	MASCULINE
COMPLEX	_ _ _ _ _ _ _	SIMPLE
NARROW	_ _ _ _ _ _ _	WIDE
CONCRETE	_ _ _ _ _ _ _	ABSTRACT
EXCITING	_ _ _ _ _ _ _	UNEXCITING
DIRECT	_ _ _ _ _ _ _	INDIRECT
CLEAR	_ _ _ _ _ _ _	CONFUSED
PLAIN	_ _ _ _ _ _ _	INTRICATE
WHOLE	_ _ _ _ _ _ _	PARTIAL
EASY	_ _ _ _ _ _ _	DIFFICULT
IMPERFECT	_ _ _ _ _ _ _	PERFECT
LONG	_ _ _ _ _ _ _	SHORT
RATIONAL	_ _ _ _ _ _ _	INTUITIVE
COLORLESS	_ _ _ _ _ _ _	COLORFUL
AWKWARD	_ _ _ _ _ _ _	GRACEFUL
WEAK	_ _ _ _ _ _ _	STRONG
SHARP	_ _ _ _ _ _ _	BLUNT
CAUTIOUS	_ _ _ _ _ _ _	RASH
BLAND	_ _ _ _ _ _ _	PUNGENT
SOFT	_ _ _ _ _ _ _	HARD
UNUSUAL	_ _ _ _ _ _ _	USUAL
VAGUE	_ _ _ _ _ _ _	DEFINITE
ORGANIZED	_ _ _ _ _ _ _	UNORGANIZED
SMALL	_ _ _ _ _ _ _	BIG
CONSTRAINED	_ _ _ _ _ _ _	FREE

CHANGEABLE	_ _ _ _ _ _ _	STABLE
FORMLESS	_ _ _ _ _ _ _	FORMED
OBJECTIVE	_ _ _ _ _ _ _	SUBJECTIVE
UGLY	_ _ _ _ _ _ _	BEAUTIFUL
SYMMETRICAL	_ _ _ _ _ _ _	ASYMMETRICAL
INCOMPLETE	_ _ _ _ _ _ _	COMPLETE
CONSTRICTED	_ _ _ _ _ _ _	SPACIOUS
WARM	_ _ _ _ _ _ _	COOL
BORING	_ _ _ _ _ _ _	INTERESTING
ADULT	_ _ _ _ _ _ _	CHILDISH
ANGULAR	_ _ _ _ _ _ _	ROUNDED
MATURE	_ _ _ _ _ _ _	IMMATURE
INTELLIGENT	_ _ _ _ _ _ _	UNINTELLIGENT
SLOW	_ _ _ _ _ _ _	FAST
ARTLESS	_ _ _ _ _ _ _	ARTFUL
SMOOTH	_ _ _ _ _ _ _	ROUGH
NON REPRESENTATIONAL	_ _ _ _ _ _ _	REPRESENTATIONAL
UNBALANCED	_ _ _ _ _ _ _	BALANCED
TANGIBLE	_ _ _ _ _ _ _	INTANGIBLE
CURVED	_ _ _ _ _ _ _	STRAIGHT
IMPRECISE	_ _ _ _ _ _ _	PRECISE
FALSE	_ _ _ _ _ _ _	TRUE

APPENDIX C

INSTRUCTIONS

The purpose of this study is to measure the meanings of certain things to various people. You will be presented a concept either written, spoken or a picture. You will be asked to rate this concept on a series of descriptive statements. There will be thirty-five statements in all. Here is how to mark the descriptive statements.

Going to college is enjoyable.

Agree Strongly	Agree	Agree Slightly	Neutral	Disagree Slightly	Disagree	Disagree Strongly

If you are having a good time here at Oshkosh, and you think college is very enjoyable, then you would circle "Agree Strongly" as we have done. If you think college is neither enjoyable nor not enjoyable or if you are undecided, or if you think the question doesn't apply then you would circle the neutral point. If you were to disagree with the statement you would circle one of the disagreement positions according to the strength of your disagreement.

On some of the statements we have reversed the order of the answers so that they read like this:

Going to college is enjoyable.

Disagree Strongly	Disagree	Disagree Slightly	Neutral	Agree Slightly	Agree	Agree Strongly

This has been done simply to aid us in adding up the results.

Never mark more than one answer per statement. Work these statements straight through--DO NOT LOOK BACK AND FORTH. Make each item a separate and independent judgment. Work at a fairly high speed through this test. Do not worry or puzzle over individual items--there are no "right" answers only your answers. It is your first impressions that we want, but please do not be careless because we want your true impressions. Thank you and please go right on to the next page.

In describing this statement the word curved would be used.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

This statement seems whole.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement appears rounded.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

This statement is perfect.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I feel this statement is confused.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

Formlessness is a trait of this statement.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

This statement appeals to maturity.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement exhibits precision.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement gives the feeling of being balanced.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement has a softness about it.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I would judge this statement as being active.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement appears colorless.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I think this statement is childish.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

This statement gives the impression of being graceful.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement is exciting.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

To me this statement seems vague.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I think this statement is slow.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

Smoothness is a characteristic of this statement.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

Artful discribes this statement.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

The adjective blunt would discribe this statement.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

In discribing this statement the word difficult would be used.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement appears incomplete.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

This statement has freedom.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I think this statement is direct.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement is unemotional.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

Spacious is a good word for this statement.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I think this statement is complex.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

Organized is a good word for this statement.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

Femininity is exhibited by this statement.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I have a feeling of coolness from this statement.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

I must say that this statement is boring.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

This statement seems stable.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

This statement gives the appearance of being unintelligent.

disagree strongly | disagree slightly | disagree slightly | neutral | agree slightly | agree slightly | agree strongly

This statement has objectivity.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

Beautiful is a good word for this statement.

agree strongly | agree slightly | agree slightly | neutral | disagree slightly | disagree slightly | disagree strongly

APPENDIX D

Theory of Operation, GSA Device

by J. V. Woolsey,
Electronic Systems Consultant

A three-branch power supply was constructed for each test position which consisted of two heavy duty 1.5 volt batteries and two voltage controls (1 megohm potentiometers). The batteries were connected in series, the common ground being the common connection between the batteries. A potentiometer was installed in each "non ground" branch of the power supply. This provided a common ground for each test position as well as two controlled voltages, one ranging between -1.5 volts and 0; the other ranging from 0 to + 1.5 volts.

Each test position consisted of two one-megohm potentiometers, one of which was equipped with a pull-on switch unit. A dropping resistor was placed between each potentiometer and its branch of the power supply.

The units were wired so that the following voltages were fed to the recorder as respondents made specific actions: As the respondent moved the left-hand potentiometer from the counter-clockwise position to maximum clockwise position, voltage to the recorder varied from 0 volts to -1.0 volts. As the right-hand potentiometer was varied toward the clockwise position, voltage to the recorder varied from 0 volts to +1.0 volts. If the pull-on switch was actuated, the recorder was fed +1.1 volts. All voltages were, of course, d.c. voltages.

The voltage controls in each branch of each power supply allowed the researcher to calibrate the equipment directly on the recorder prior to each testing session. This calibration consisted of setting the recorder pen so it rested at mid-scale when 0 volts was applied, (respondent switch off, both potentiometers counter-clockwise). As

the appropriate respondent control was set at maximum, the researcher set his power supply control so that full-scale (either negative or positive) readings were obtained. When the pull-on switch was actuated an off-scale reading was obtained.

APPENDIX E

S D SCALES3

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE VISUAL MEDIUM

Variable numbers refer to the order of scales presented.

Factor:

1	2	3	4	h
Variable 1 -0.014	0.648	0.044	-0.076	0.431
Variable 2 0.168	-0.027	0.519	-0.002	0.318
Variable 3 -0.069	0.609	0.049	-0.004	0.408
Variable 4 -0.037	0.202	0.310	0.059	0.266
Variable 5 -0.037	-0.181	0.614	-0.282	0.543
Variable 6 0.036	0.164	0.451	-0.001	0.327
Variable 7 -0.128	-0.014	-0.031	0.498	0.497
Variable 8 0.134	0.260	0.460	0.161	0.431
Variable 9 -0.241	-0.011	0.315	-0.012	0.414
Variable 10 0.033	0.701	-0.030	-0.002	0.501
Variable 11 0.476	-0.059	-0.068	0.450	0.360
Variable 12 0.253	-0.023	-0.108	0.494	0.245
Variable 13 -0.059	-0.021	-0.103	0.577	0.492
Variable 14 -0.070	-0.281	0.306	0.198	0.460
Variable 15 0.561	0.008	0.045	0.633	0.525
Variable 16 0.214	0.074	0.630	-0.043	0.439
Variable 17 0.039	0.125	0.019	0.442	0.303
Variable 18 0.025	0.270	-0.241	0.014	0.179
Variable 19 -0.001	-0.124	0.020	0.581	0.547
Variable 20 0.411	0.265	0.366	0.277	0.331
Variable 21 0.021	0.048	-0.564	0.496	0.476

Variable 22				
0.138	0.130	0.431	0.081	0.275
Variable 23				
0.201	0.583	0.239	-0.177	0.415
Variable 24				
0.194	-0.118	0.567	-0.163	0.353
Variable 25				
0.611	0.031	-0.027	0.529	0.520
Variable 26				
0.122	0.350	-0.072	-0.124	0.228
Variable 27				
0.405	0.040	-0.240	0.546	0.435
Variable 28				
0.013	0.057	0.476	-0.001	0.363
Variable 29				
-0.071	0.434	-0.091	0.154	0.254
Variable 30				
0.317	-0.097	0.113	0.179	0.123
Variable 31				
0.288	-0.072	0.011	0.701	0.543
Variable 32				
-0.250	0.176	0.319	-0.328	0.331
Variable 33				
0.064	0.074	0.018	0.500	0.351
Variable 34				
0.192	0.079	0.319	-0.010	0.109
Variable 35				
0.061	-0.220	0.271	0.388	0.492

APPENDIX F

S D SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE WRITTEN MEDIUM

Variable numbers refer to the order of scales presented.

Factor:

1	2	3	4	h
Variable 1				
0.057	-0.142	-0.035	0.095	0.050
Variable 2				
0.034	-0.028	-0.048	0.406	0.242
Variable 3				
0.062	-0.092	-0.112	0.108	0.053
Variable 4				
0.049	-0.084	0.068	0.388	0.270
Variable 5				
0.055	-0.550	0.446	0.234	0.586
Variable 6				
-0.021	0.070	0.016	0.507	0.374
Variable 7				
0.642	0.014	-0.042	-0.002	0.720
Variable 8				
-0.037	-0.036	0.011	0.545	0.407
Variable 9				
-0.164	0.074	0.220	0.490	0.423
Variable 10				
0.104	0.144	-0.308	0.017	0.119
Variable 11				
0.016	0.082	0.225	-0.042	0.111
Variable 12				
-0.001	0.093	0.270	0.002	0.158
Variable 13				
0.738	-0.037	-0.054	-0.028	0.803
Variable 14				
-0.073	-0.117	0.394	0.300	0.373
Variable 15				
0.082	0.003	0.448	-0.118	0.297
Variable 16				
0.115	-0.281	0.071	0.436	0.440
Variable 17				
0.018	0.028	0.205	0.063	0.093
Variable 18				
-0.003	-0.023	-0.212	-0.248	0.214
Variable 19				
0.000	0.173	0.305	0.145	0.340
Variable 20				
0.033	-0.010	0.225	0.051	0.095
Variable 21				
0.008	0.746	-0.527	-0.100	0.816

Variable 22				
-0.093	0.154	-0.030	0.604	0.471
Variable 23				
0.003	0.087	-0.478	0.368	0.329
Variable 24				
0.026	-0.267	0.100	0.372	0.319
Variable 25				
0.110	-0.064	0.381	-0.272	0.206
Variable 26				
0.128	-0.006	-0.255	0.110	0.106
Variable 27				
0.046	0.606	-0.501	0.013	0.557
Variable 28				
0.019	-0.040	-0.053	0.537	0.407
Variable 29				
0.296	-0.106	-0.114	-0.084	0.108
Variable 30				
0.007	0.004	0.371	-0.046	0.192
Variable 31				
0.140	-0.103	0.587	-0.059	0.473
Variable 32				
-0.076	0.040	-0.213	0.518	0.314
Variable 33				
0.542	0.021	0.060	0.075	0.602
Variable 34				
0.019	-0.045	-0.060	0.272	0.108
Variable 35				
-0.123	-0.016	0.491	0.197	0.419

APPENDIX G

S D SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE SPOKEN MEDIUM

Variable numbers refer to the order of scales presented.

Factor:

1				
Variable 1				
0.697	0.009	0.047	0.004	0.506
Variable 2				
-0.138	-0.210	0.038	0.421	0.244
Variable 3				
0.691	-0.052	-0.035	0.002	0.504
Variable 4				
0.010	-0.029	-0.002	0.404	0.238
Variable 5				
0.044	0.037	-0.602	0.685	0.629
Variable 6				
-0.120	-0.110	0.054	0.476	0.336
Variable 7				
0.047	0.076	0.598	0.021	0.562
Variable 8				
0.077	-0.279	0.120	0.451	0.359
Variable 9				
0.145	0.006	-0.130	0.444	0.283
Variable 10				
0.130	-0.035	0.301	-0.062	0.115
Variable 11				
0.003	0.364	0.035	0.024	0.188
Variable 12				
-0.157	0.544	0.006	-0.082	0.371
Variable 13				
0.021	0.048	0.636	-0.043	0.547
Variable 14				
0.094	0.282	-0.174	0.349	0.324
Variable 15				
0.004	0.580	0.058	-0.112	0.385
Variable 16				
-0.021	-0.071	-0.190	0.627	0.439
Variable 17				
-0.014	0.160	0.374	-0.085	0.224
Variable 18				
0.211	0.003	0.001	-0.356	0.217
Variable 19				
-0.053	0.304	0.189	0.071	0.269
Variable 20				
0.101	0.142	0.005	0.245	0.175
Variable 21				
-0.026	-0.079	0.694	-0.549	0.577

Variable 22				
-0.050	-0.156	0.104	0.425	0.295
Variable 23				
0.242	-0.205	0.166	-0.047	0.130
Variable 24				
-0.062	-0.226	-0.138	0.447	0.210
Variable 25				
-0.001	0.622	0.053	-0.235	0.412
Variable 26				
0.221	-0.214	0.070	0.027	0.108
Variable 27				
-0.127	-0.020	0.654	-0.329	0.461
Variable 28				
-0.029	-0.000	-0.077	0.446	0.259
Variable 29				
-0.021	-0.096	0.113	0.038	0.024
Variable 30				
0.024	0.284	0.107	-0.026	0.129
Variable 31				
-0.014	0.722	-0.115	0.059	0.642
Variable 32				
-0.017	-0.216	-0.004	0.411	0.212
Variable 33				
0.018	0.132	0.524	0.060	0.520
Variable 34				
-0.174	-0.137	0.093	0.096	0.060
Variable 35				
-0.080	0.348	-0.088	0.274	0.328

APPENDIX H

L T SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE VISUAL MEDIUM

Variable numbers refer to the order of scales presented.

Factor: 1	2	3	4	h
Variable 1 -0.181	0.545	0.253	-0.028	0.328
Variable 2 0.594	-0.199	-0.017	0.304	0.635
Variable 3 -0.337	0.422	0.013	-0.195	0.283
Variable 4 0.334	0.023	0.008	0.252	0.316
Variable 5 0.327	-0.015	-0.306	-0.072	0.418
Variable 6 0.312	0.017	-0.147	0.035	0.284
Variable 7 -0.011	0.086	0.055	0.528	0.322
Variable 8 0.265	0.397	0.365	0.219	0.442
Variable 9 -0.011	0.517	-0.171	-0.221	0.608
Variable 10 -0.010	0.173	0.641	0.026	0.524
Variable 11 -0.014	-0.194	-0.226	0.458	0.420
Variable 12 -0.016	0.019	0.003	0.572	0.392
Variable 13 0.043	0.173	0.195	0.613	0.429
Variable 14 -0.028	0.027	-0.525	0.097	0.506
Variable 15 -0.161	0.039	-0.103	0.621	0.513
Variable 16 0.376	-0.119	-0.167	0.313	0.510
Variable 17 0.114	-0.006	0.049	0.494	0.319
Variable 18 -0.066	-0.015	0.538	0.102	0.484
Variable 19 -0.049	0.217	-0.042	0.509	0.422
Variable 20 0.016	-0.088	-0.164	0.650	0.656

Variable 21				
-0.132	0.095	0.380	0.368	0.260
Variable 22				
0.546	-0.029	0.158	0.337	0.560
Variable 23				
0.416	0.036	0.472	-0.093	0.383
Variable 24				
0.413	0.012	-0.023	0.118	0.348
Variable 25				
-0.091	-0.039	-0.025	0.568	0.389
Variable 26				
0.182	-0.102	0.380	0.042	0.215
Variable 27				
-0.007	-0.018	0.456	0.585	0.474
Variable 28				
0.240	0.452	-0.020	0.039	0.664
Variable 29				
0.010	0.248	0.347	-0.014	0.166
Variable 30				
-0.001	0.018	0.131	0.021	0.022
Variable 31				
0.036	-0.027	-0.176	0.577	0.575
Variable 32				
0.548	-0.012	0.049	0.284	0.610
Variable 33				
0.050	0.029	0.036	0.608	0.454
Variable 34				
0.085	0.264	0.075	0.330	0.280
Variable 35				
-0.035	0.128	-0.319	0.430	0.604

APPENDIX I

L T SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE WRITTEN MEDIUM

Variable numbers refer to the order of scales presented.

Factor:

1	2	3	h
Variable 1 -0.207	0.178	0.123	0.068
Variable 2 -0.040	-0.032	0.557	0.334
Variable 3 -0.324	0.183	-0.045	0.118
Variable 4 0.254	-0.052	0.433	0.365
Variable 5 0.028	0.053	0.429	0.251
Variable 6 -0.049	0.138	0.471	0.314
Variable 7 -0.029	0.267	0.307	0.261
Variable 8 0.026	-0.060	0.556	0.349
Variable 9 0.212	0.031	0.361	0.296
Variable 10 -0.542	0.060	0.179	0.332
Variable 11 0.044	0.238	-0.040	0.088
Variable 12 0.076	0.453	-0.102	0.306
Variable 13 -0.167	0.307	0.381	0.314
Variable 14 0.606	0.068	-0.035	0.550
Variable 15 0.153	0.571	-0.070	0.565
Variable 16 -0.126	0.069	0.521	0.310
Variable 17 -0.007	0.299	0.153	0.186
Variable 18 -0.381	-0.040	-0.131	0.289
Variable 19 0.257	0.246	0.120	0.328
Variable 20 -0.052	0.684	0.021	0.614
Variable 21 -0.259	0.091	-0.209	0.151

Variable 22 -0.041	0.024	0.552	0.350
Variable 23 -0.405	-0.125	0.254	0.281
Variable 24 0.045	-0.150	0.625	0.425
Variable 25 0.064	0.516	-0.248	0.370
Variable 26 -0.270	0.033	0.139	0.085
Variable 27 -0.222	0.174	-0.082	0.068
Variable 28 0.033	0.049	0.529	0.369
Variable 29 -0.298	-0.058	0.194	0.138
Variable 30 -0.154	0.128	-0.105	0.043
Variable 31 -0.123	0.711	0.023	0.613
Variable 32 0.013	-0.047	0.608	0.417
Variable 33 -0.186	0.260	0.369	0.258
Variable 34 0.063	-0.009	0.385	0.195
Variable 35 0.387	0.347	0.034	0.579

APPENDIX J

L T SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE SPOKEN MEDIUM

Variable numbers refer to the order of scales presented.

Factor:

1	2	3	4	5	h
Variable 1					
0.509	-0.035	-0.065	0.004	0.036	0.313
Variable 2					
-0.016	0.004	-0.029	-0.053	0.587	0.468
Variable 3					
0.647	0.036	0.053	-0.031	-0.014	0.511
Variable 4					
-0.022	0.075	-0.046	0.216	0.386	0.385
Variable 5					
0.061	0.067	-0.344	0.011	0.495	0.621
Variable 6					
0.231	-0.020	-0.020	0.141	0.443	0.335
Variable 7					
0.006	0.332	0.143	0.041	0.210	0.367
Variable 8					
0.109	-0.119	0.212	0.100	0.631	0.446
Variable 9					
0.267	-0.238	0.097	0.275	0.547	0.377
Variable 10					
0.004	0.171	0.124	-0.488	0.046	0.393
Variable 11					
-0.123	-0.005	0.031	0.474	-0.011	0.396
Variable 12					
-0.028	0.011	0.061	0.402	-0.017	0.254
Variable 13					
-0.007	0.491	0.109	-0.132	0.107	0.451
Variable 14					
0.137	-0.133	0.038	0.596	0.264	0.524
Variable 15					
-0.024	0.251	-0.016	0.459	0.034	0.619
Variable 16					
0.086	0.013	-0.174	0.084	0.545	0.532
Variable 17					
-0.026	0.409	-0.125	-0.006	0.077	0.336
Variable 18					
0.048	0.086	0.159	-0.252	-0.274	0.277
Variable 19					
0.020	0.126	-0.003	0.327	0.134	0.305
Variable 20					
0.007	0.548	-0.296	0.164	-0.046	0.759
Variable 21					
0.104	-0.017	0.747	0.033	-0.046	0.719

Variable 22					
0.031	0.014	-0.020	0.022	0.611	0.520
Variable 23					
-0.001	-0.030	0.206	-0.225	0.236	0.207
Variable 24					
-0.031	-0.045	0.051	-0.031	0.595	0.435
Variable 25					
-0.016	0.163	-0.057	0.319	-0.147	0.275
Variable 26					
0.270	-0.026	0.043	-0.152	0.161	0.171
Variable 27					
0.014	0.049	0.646	-0.015	0.009	0.556
Variable 28					
-0.010	-0.071	-0.060	0.058	0.624	0.515
Variable 29					
0.161	0.162	-0.038	-0.396	-0.043	0.273
Variable 30					
-0.023	0.290	-0.222	-0.208	-0.139	0.111
Variable 31					
0.060	0.460	-0.209	0.207	0.001	0.627
Variable 32					
-0.035	0.017	0.013	-0.056	0.656	0.583
Variable 33					
-0.024	0.264	0.147	-0.025	0.349	0.393
Variable 34					
-0.001	0.060	0.053	-0.066	0.271	0.120
Variable 35					
0.040	0.018	-0.015	0.533	0.248	0.585

APPENDIX K

S S A SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE VISUAL MEDIUM

Variable numbers refer to the order of scales presented.

Factor:

	1	2	3	4	5	h
Variable 1	0.195	-0.044	-0.074	0.169	0.199	0.247
Variable 2	0.287	0.299	0.025	0.074	-0.004	0.290
Variable 3	0.136	0.073	-0.249	0.220	-0.033	0.244
Variable 4	-0.413	-0.258	0.158	0.014	0.227	0.361
Variable 5	0.281	0.059	0.197	0.294	-0.303	0.553
Variable 6	0.196	-0.007	0.021	0.327	0.039	0.264
Variable 7	-0.129	-0.024	-0.080	0.571	0.376	0.451
Variable 8	0.500	0.006	0.194	0.262	-0.115	0.540
Variable 9	-0.038	-0.022	-0.149	0.436	-0.282	0.527
Variable 10	0.418	-0.142	0.010	-0.001	0.006	0.464
Variable 11	0.209	-0.015	0.466	-0.107	-0.023	0.300
Variable 12	0.242	-0.037	0.490	-0.060	0.003	0.330
Variable 13	-0.250	-0.005	-0.066	0.327	0.488	0.290
Variable 14	0.268	0.462	-0.007	-0.031	-0.355	0.543
Variable 15	-0.041	0.071	0.402	-0.021	0.089	0.479
Variable 16	0.457	0.213	0.200	0.183	-0.268	0.617
Variable 17	0.001	0.184	-0.140	0.230	0.305	0.229
Variable 18	0.234	-0.029	0.003	-0.271	-0.162	0.199
Variable 19	0.034	0.285	0.028	0.106	-0.074	0.302
Variable 20	0.002	-0.252	0.123	0.368	0.325	0.259
Variable 21	0.004	0.033	0.036	0.016	0.640	0.580

Variable 22					
0.583	0.202	0.227	0.010	0.005	0.537
Variable 23					
-0.069	-0.347	0.054	0.217	0.335	0.269
Variable 24					
0.080	0.199	-0.018	0.291	0.042	0.319
Variable 25					
0.023	-0.264	0.666	0.048	-0.013	0.619
Variable 26					
0.072	-0.316	0.069	0.159	0.154	0.211
Variable 27					
-0.006	-0.098	0.286	-0.014	0.438	0.391
Variable 28					
-0.009	-0.135	0.043	0.667	0.005	0.664
Variable 29					
0.389	0.139	-0.081	-0.075	0.104	0.359
Variable 30					
-0.237	-0.161	0.135	0.109	-0.031	0.165
Variable 31					
0.066	0.473	0.017	-0.063	-0.032	0.435
Variable 32					
0.059	-0.013	-0.120	0.314	-0.061	0.200
Variable 33					
-0.104	0.054	0.014	0.362	0.104	0.275
Variable 34					
-0.008	-0.145	-0.039	0.309	0.143	0.126
Variable 35					
-0.027	0.625	-0.206	0.022	0.020	0.620

APPENDIX L

S S A SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE WRITTEN MEDIUM

Variable numbers refer to the order of scales presented.

Factor:

	1	2	3	4	5	h
Variable 1	0.025	-0.271	0.121	-0.172	0.245	0.180
Variable 2	-0.067	-0.286	-0.001	0.030	0.642	0.471
Variable 3	0.063	-0.241	0.097	-0.258	0.094	0.142
Variable 4	0.117	-0.214	0.403	-0.033	-0.579	0.555
Variable 5	-0.002	-0.024	-0.184	-0.590	0.425	0.618
Variable 6	0.367	-0.022	-0.009	-0.017	0.385	0.340
Variable 7	-0.027	-0.003	0.652	0.001	0.276	0.750
Variable 8	0.250	0.163	0.062	0.092	0.490	0.493
Variable 9	-0.003	-0.121	0.016	-0.110	0.546	0.381
Variable 10	0.200	-0.002	0.190	0.116	0.118	0.130
Variable 11	-0.160	0.314	0.099	0.072	0.065	0.179
Variable 12	-0.110	0.360	0.051	-0.009	0.053	0.197
Variable 13	0.022	0.055	0.554	0.254	0.199	0.521
Variable 14	0.016	0.083	-0.077	-0.298	0.327	0.288
Variable 15	0.032	0.472	0.029	0.004	0.000	0.264
Variable 16	0.359	0.067	-0.212	-0.124	0.539	0.532
Variable 17	0.055	0.179	-0.025	-0.324	0.005	0.184
Variable 18	0.077	-0.238	-0.081	0.074	-0.271	0.270
Variable 19	0.029	0.340	-0,167	-0.092	0.220	0.270
Variable 20	-0.040	0.066	0.216	0.062	0.093	0.091
Variable 21	0.040	-0.009	0.024	0.735	0.024	0.579
Variable 22	0.041	-0.047	-0.046	0.158	0.763	0.682

Variable 23					
0.141	-0.215	-0.001	0.194	0.181	0.141
Variable 24					
-0.136	0.002	0.122	-0.116	0.231	0.151
Variable 25					
0.035	0.454	-0.106	0.218	-0.008	0.247
Variable 26					
0.823	-0.011	-0.004	0.010	-0.000	0.689
Variable 27					
-0.058	-0.104	0.250	0.429	-0.009	0.266
Variable 28					
0.028	-0.220	-0.008	-0.165	0.536	0.374
Variable 29					
0.232	-0.235	0.045	-0.062	0.019	0.125
Variable 30					
-0.429	-0.020	0.249	-0.110	-0.021	0.253
Variable 31					
0.283	0.517	0.136	-0.199	-0.044	0.511
Variable 32					
0.252	-0.256	0.214	0.022	0.326	0.343
Variable 33					
0.050	-0.018	0.583	-0.003	0.227	0.586
Variable 34					
-0.021	-0.158	0.055	-0.320	0.132	0.149
Variable 35					
0.209	0.500	0.011	-0.020	0.010	0.338

APPENDIX M

S S A SCALES

SIMPLE STRUCTURE MATRIX FOR DATA FROM THE SPOKEN MEDIUM

Variable numbers refer to the order of scales presented.

Factor: 1	2	3	4	5	h
Variable 1					
0.004	-0.012	-0.208	0.004	0.227	0.115
Variable 2					
0.253	-0.088	-0.106	0.026	0.525	0.377
Variable 3					
0.017	-0.005	-0.052	0.025	0.285	0.093
Variable 4					
0.063	-0.106	0.398	-0.004	-0.363	0.399
Variable 5					
0.100	0.011	-0.033	0.064	0.764	0.636
Variable 6					
-0.066	0.509	0.201	-0.019	0.325	0.375
Variable 7					
0.857	-0.174	0.009	-0.021	0.219	0.785
Variable 8					
0.007	0.402	-0.147	0.222	0.220	0.425
Variable 9					
0.230	0.015	-0.030	-0.032	0.531	0.344
Variable 10					
0.118	0.196	-0.378	-0.012	-0.192	0.349
Variable 11					
0.173	0.128	0.247	0.212	0.099	0.137
Variable 12					
0.006	0.020	0.252	0.528	0.058	0.303
Variable 13					
0.639	-0.019	0.027	-0.000	0.073	0.436
Variable 14					
0.011	-0.058	0.086	0.273	0.486	0.362
Variable 15					
-0.063	0.031	0.403	0.554	0.183	0.422
Variable 16					
-0.034	0.394	0.038	0.183	0.555	0.546
Variable 17					
0.074	-0.059	-0.089	0.273	-0.195	0.155
Variable 18					
-0.124	0.024	-0.402	-0.035	-0.278	0.273
Variable 19					
-0.007	-0.103	0.081	0.304	0.298	0.231
Variable 20					
0.161	0.128	0.012	0.076	0.047	0.071
Variable 21					
0.172	0.379	0.047	0.016	-0.717	0.756
Variable 22					
-0.041	0.441	-0.012	0.270	0.320	0.448

Variable 23					
0.112	0.356	0.017	-0.301	0.115	0.289
Variable 24					
0.099	0.140	0.058	-0.162	0.481	0.282
Variable 25					
-0.007	0.130	0.707	0.494	0.114	0.587
Variable 26					
0.249	0.343	0.168	-0.406	0.249	0.501
Variable 27					
0.350	0.049	-0.058	0.018	-0.323	0.265
Variable 28					
0.009	0.047	0.008	-0.046	0.533	0.288
Variable 29					
0.169	0.064	-0.351	-0.433	-0.189	0.353
Variable 30					
0.152	-0.005	0.126	0.077	0.035	0.043
Variable 31					
0.038	0.091	0.159	0.527	0.300	0.433
Variable 32					
-0.157	0.492	-0.102	0.003	0.021	0.314
Variable 33					
0.542	0.003	-0.022	-0.165	0.271	0.389
Variable 34					
0.010	0.065	0.002	-0.244	0.121	0.083
Variable 35					
0.051	0.013	0.071	0.594	0.158	0.458